

Who are the cigarette smokers among adolescents? What characterizes them? How can their habits be changed? The following study broaches these and other questions and endeavors to answer some of them.

CIGARETTE SMOKING AMONG HIGH SCHOOL STUDENTS

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THE ACCUMULATION of scientific evidence implicating cigarette smoking as a health hazard, and particularly as the major cause of lung cancer, has led to an increased sense of responsibility among individuals and agencies concerned with public health to see that young people are made aware of these hazards before they have established smoking as a regular habit. The present study was undertaken by the staff of the American Cancer Society because it was felt that more information was needed about (1) the amount and patterning of smoking among school students, (2) the factors that distinguish smokers and nonsmokers in this group, (3) the motivations that are common in the taking up of smoking, and (4) the approaches that might be most effective in influencing smoking behavior.

A set of circumstances which included the availability of two local psychologists to conduct the field work and the cooperation of the local school system resulted in the choice of Portland, Ore., and some of the schools in the surrounding urbanized area as the locale of the study.

The basic design of the study was as follows:

1. An initial period of exploratory interviews and questionnaires, including projective technics, to develop appropriate questionnaires on smoking be-

havior and attitudes toward smoking, to select other questions that gave promise of relationship to the taking up of smoking, and to determine some of the factors that would be important in formulating an effective approach to presenting information on the hazards of smoking to this group. This phase took place largely in the period from May to September, 1958.

2. Administration of an unsigned questionnaire on smoking habits and background data to all the high school students in the 11 city (Portland) public high schools, five Catholic parochial high schools, and five high schools in Multnomah and Clackamas Counties outside the city limits but part of the urbanized area. This took place in October, 1958.

3. On the basis of the October questionnaire, 19 of the 21 schools were divided into six experimental groups ranging from two to four schools in number and matched as closely as possible for level of smoking.

4. One of the six experimental groups of schools served as a control and no special educational activities were undertaken during the course of the year that would not have taken place anyhow. The other five groups were reached three times during the course of the year with mass educational material (pamphlets, flyers, and posters) each group receiving

Table 1—Percentage Distribution of Cigarette Smoking Habits by School Grade and Sex, All Students

	Boys				Girls					
	Freshman	Sophomore	Junior	Senior	Total	Freshman	Sophomore	Junior	Senior	Total
Never smoked	30.8	25.4	22.9	19.0	24.9	58.9	48.3	43.5	31.7	46.5
Experimented	41.6	36.5	32.8	33.4	36.3	32.3	35.9	33.2	33.6	33.9
Ex-occasional	2.2	1.9	1.7	1.8	1.9	0.7	0.6	0.9	1.2	0.8
Ex-regular	7.2	6.6	7.2	6.2	6.8	1.8	2.2	2.3	2.8	2.2
Current occasional	3.8	4.5	4.4	4.3	4.2	1.7	2.4	3.9	4.4	3.0
Current regular										
1-6 per week	4.0	6.2	5.4	5.6	5.3	1.4	3.0	4.5	6.4	3.6
1-4 per day	5.6	7.2	7.4	6.1	6.6	2.2	3.7	4.8	7.7	4.4
5-9 per day	2.9	6.1	8.4	10.1	6.6	0.8	2.4	4.2	7.5	3.4
10-19 per day	1.1	4.2	6.6	9.4	5.0	0.2	0.8	1.8	3.7	1.5
20+ per day	0.9	1.5	3.2	4.3	2.3	0.1	0.6	0.9	1.0	0.6
No. of students	2,956	3,184	2,756	2,164	11,060	2,766	3,317	2,657	2,180	10,920
Per cent	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Percentage current regular	14.5	25.2	31.1	35.4	25.8	4.6	10.6	16.2	26.2	13.6
										19.7
										21,980
										(100)

Table 1a—Percentage Distribution of Current Regular Cigarette Smokers by Amount Smoked, School Grade, and Sex, All Students

	Boys				Girls					
	Freshman	Sophomore	Junior	Senior	Total	Freshman	Sophomore	Junior	Senior	Total
1- 6 per week	27.3	24.5	17.5	15.8	20.5	29.7	28.8	27.7	24.3	26.8
1- 4 per day	38.7	28.7	23.7	17.1	25.6	46.9	35.3	29.8	29.4	32.4
5- 9 per day	20.3	24.3	27.1	28.5	25.7	16.4	22.5	26.0	28.5	25.3
10-19 per day	7.7	16.6	21.4	26.5	19.4	4.7	8.0	11.2	14.0	10.9
20+ per day	6.1	5.9	10.3	12.0	8.9	2.3	5.4	5.3	3.7	4.5
No. of students	429	801	856	765	2,851	128	351	430	571	1,480
Per cent	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
										4,331
										(100)

one of the five following approaches:

a. Contemporary—Emphasis on those aspects of smoking having immediate or current meaning to the high school student.

b. Remote—Emphasis on the relationship of lung cancer to cigarette smoking in terms of effects in later life. Approaches (a) and (b) were included to test which was most effective in the light of the fact that interviews showed that contemporary effects of smoking are frequently reported as reasons for not smoking, but projective materials tend to show more underlying concern with the remote effects.

c. Both-Sided—Since some communication studies indicate that both-sided messages may be more effective than one-sided messages for those who are not committed to one side or the other, this approach was designed to be somewhat permissive with respect to smoking.

d. Authoritative—Since smoking is sometimes an act of rebellion against authority, this was included to test the appeals to authority which are common in most health education messages.

e. Adult Role-Taking—Since smoking may serve as a symbol of being "grown-up" this approach was designed to let the high school student reverse the usual parent-child role and assume the role of the person who provides information on health (i.e. the lung cancer-smoking relationship) to the parent or other adults in the family circle.

5. Near the end of May the questionnaire was again administered to all the students of the same high schools. The first portion of the questionnaire on smoking habits was identical with that used nearly eight months earlier. Some changes were made in the second portion as a result of the findings of the earlier questionnaire.

6. Two additional schools outside the Portland metropolitan area were used in an effort to determine what effect could be achieved with a more intensive personalized approach (as opposed to the mass communication approach in the other schools). In the course of this study, a 21-item Likert attitude scale and a five-item Guttman attitude scale were developed from a 45-item questionnaire based largely on responses to a sentence completion test given during the exploratory phase. The five-item Guttman atti-

Table 2—Percentage of Current Regular Cigarette Smokers by Parental Smoking Habits, All Students

	Boys						Girls						Standardized Percentages													
	Freshman			Junior			Sophomore			Senior																
	No.	%		No.	%		No.	%		No.	%		No.	%		Boys	Girls									
Both smoke	1,020	18.3		1,093	32.5		978	37.5		726	42.7		1,022	6.5		1,185	15.3		898	23.2		768	32.8		31.9	18.5
Only father smokes	784	14.5		844	23.9		760	34.1		630	36.2		726	3.3		905	9.9		740	14.6		585	25.0		26.3	12.4
Only mother smokes	125	14.4		164	23.2		130	28.5		99	30.3		106	7.5		156	9.6		110	29.1		83	31.3		23.6	18.1
One an ex-smoker and one a current smoker	137	15.3		168	25.6		138	26.1		112	30.4		144	4.2		151	8.6		147	15.0		105	24.8		23.9	12.3
One or both an ex-smoker and neither a current smoker	201	11.4		205	19.0		181	18.8		155	32.3		150	3.3		212	4.2		158	7.6		160	24.4		19.5	8.8
Neither smokes	531	8.1		566	14.7		480	21.0		371	26.1		443	3.4		558	4.1		489	7.0		375	15.2		16.7	6.8
One or both not stated	158	14.6		144	28.5		89	24.7		71	22.5		175	2.3		150	13.3		115	12.2		104	24.0		22.7	12.4
Total	2,956	14.5		3,184	25.2		2,756	31.1		2,164	35.4		2,766	4.6		3,317	10.6		2,657	16.2		2,180	26.2		25.8	13.6
P (based on column variation)	0.0002			<0.0001			0.0002			0.0003			0.01			<0.0001			<0.0001			<0.0001			<0.0001	<0.0001

Table 3—Percentage of Current Regular Cigarette Smokers by School System, All Students

	Boys						Girls						Standardized Percentages					
	Freshman			Junior			Sophomore			Senior								
	No.	%		No.	%		No.	%		No.	%		No.	%		Boys	Girls	
Catholic schools	422	17.1	300	32.3	275	37.8	194	44.3	271	3.0	218	13.3	180	28.3	177	42.4	32.0	20.1
City public	2,087	15.1	2,211	24.2	1,975	31.3	1,536	35.4	2,102	5.1	2,425	11.1	1,964	15.5	1,627	27.0	25.7	13.8
Suburban public	447	9.2	673	25.3	506	26.3	434	31.1	393	3.1	674	7.7	513	14.4	376	14.9	22.4	9.6
Total	2,956	14.5	3,184	25.2	2,756	31.1	2,164	35.4	2,766	4.6	3,317	10.6	2,657	16.2	2,180	26.2	25.8	13.6
P (based on column variation)	0.004		0.03		0.02		0.04		0.10		0.02		0.0001		<0.0001		<0.0001	<0.0001

tude scale was used also in the requestioning of all the students.

7. A special study was made of the effect of a film on smoking, sponsored by another organization, shown in assembly to the students of a school which was among those studied, but not included in the six experimental groupings.

8. At the same time as the requestioning of the students in the study, a nation-wide interview study of a representative sample of 4,000 high school students was undertaken by a commercial youth survey organization. The interview form used was based on the questionnaire already developed in this study. The purpose was to get nation-wide figures on smoking in the high schools by various demographic analyses and to verify the relationships found in Portland between various factors and smoking behavior.

At the present time, all the basic field work for the study as outlined previously has been completed. This report is based solely on an analysis of the first questionnaire (October, 1958) administered at the beginning of the study.

Distribution of Smoking Behavior

Information on smoking was obtained near the beginning of the school year from 21,980 high school students (11,060 boys and 10,920 girls) in the city of Portland, Ore., and the most urbanized portion of the surrounding metropolitan area in Oregon. All students from 11 Portland public high schools, five Catholic parochial high schools, and five suburban public high schools are included in the study.

Table 1 shows the percentage distribution of smoking habits of all students by school grade and sex. The proportion classified "Never Smoked" declines steadily during the four school years, ranging among the boys from 30.8 per cent of the freshmen to 19.0 per cent of the seniors and among the girls from 58.9 per cent of the freshmen to 31.7

per cent of the seniors. The percentage of "Experimenters"—those that tried cigarettes a few times just to see what they were like—comprises about one-third of both boys and girls, except that it is somewhat higher (41.6 per cent) among the freshman boys. Ex-smokers also do not vary significantly in frequency from class to class but are found more frequently among the boys (8.7 per cent) than among the girls (3.0 per cent). Those classified as "Current Occasional"—cigarette smoking at a frequency of less than once a week—constitute only 4.2 per cent of the boys and 3.0 per cent of the girls and do not show any systematic class variation.

The remainder of this report will be concerned with regular cigarette smoking—defined as smoking at least once a week; 25.8 per cent of the boys and 19.7 per cent of the girls are so classified. Each successive school grade has a higher percentage of smokers than the preceding class. For boys the percentage of current regular cigarette smokers is 14.5 per cent of the freshmen, 25.2 per cent of the sophomores, 31.1 per cent of the juniors, and 35.4 per cent of the seniors. For girls, the corresponding figures are 4.6 per cent for freshmen, 10.6 per cent for sophomores, 16.2 per cent for juniors, and 26.2 per cent for seniors. Table 1a shows that almost four-fifths of the boys and three-fourths of the girls who are current regular cigarette smokers do so daily and that 28.3 per cent of the boys and 15.4 per cent of the girls smoke half a pack or more per day. The amount smoked increases during the four school years among the regular smokers. For example, the percentage of regular smokers consuming a half a pack a day or more rises from 13.8 per cent of the freshman boys to 38.5 per cent of the senior boys and from 7.0 per cent of the freshman girls to 15.4 per cent of the senior girls. In order to adjust for minor variations in the proportions of students in the four

Table 4—Percentage of Current Regular Cigarette Smokers by Parental Education, All Students

	Boys						Girls						Standardized Percentages			
	Freshman			Sophomore			Junior			Senior			Boys	Girls		
	No.	%		No.	%		No.	%		No.	%					
Neither parent a high school graduate	389	22.6		417	32.4		379	38.5		294	36.4		387	24.8	32.1	17.0
One parent a high school graduate and the other not a high school graduate	456	17.8		549	29.0		489	34.2		398	35.9		397	29.0	28.7	15.5
Both parents high school graduates	677	13.4		719	24.1		588	29.4		437	34.1		393	25.4	25.1	11.5
One parent attended college and the other a high school graduate	506	11.9		524	25.2		452	28.1		363	34.7		387	28.2	24.2	13.1
Both parents attended college	594	9.1		643	16.8		556	26.8		455	31.6		393	25.7	20.1	10.7
All others, including not stated	334	16.5		332	28.3		292	32.2		217	38.2		223	22.4	28.1	14.9
Total	2,956	14.5		3,184	25.2		2,756	31.1		2,164	35.4		2,180	26.2	25.8	13.6
P (based on column variation)	<0.0001			<0.0001			0.02			0.75			0.01	0.64	<0.0001	<0.0001

school grades all over-all percentages for various subgroups have been standardized to the school grade distribution of the entire population of 11,060 boys and 10,920 girls.

Parental Smoking Behavior

A total of 7,690 (35.0 per cent) of the students had parents both of whom smoked; an additional 5,974 (27.2 per cent) reported that only the father smoked, while 973 (4.4 per cent) said that only the mother smoked. There were 1,102 (5.0 per cent) students who reported that one parent was an ex-smoker and the other parent was a current smoker; while 1,422 (6.5 per cent) reported that one or both parents was an ex-smoker and neither parent was a current smoker. The number of students who reported that neither parent smoked was 3,813 (17.3 per cent). Parental smoking histories were incomplete for the remaining 1,006 students (4.6 per cent).

Parental smoking behavior is significantly related to the smoking behavior of high school students. Table 2 shows that as regular cigarette smoking consistently rises with each successive school year and is more frequent among boys than girls it is highest among the children of families in which both parents smoke cigarettes (31.9 per cent of the boys, 18.5 per cent of the girls), intermediate in families in which only one parent smokes cigarettes (25.9 per cent of the boys, 13.1 per cent of the girls), and lowest in families in which neither parent has ever been a smoker (16.7 per cent of the boys, 6.8 per cent of the girls).

The smoking behavior of boys tends to conform more closely to that of the father; whereas the smoking behavior of the girls follows more closely that of the mother. If the father is the only parent who smokes, 26.3 per cent of the boys smoke as against 23.6 per cent in fami-

lies in which the mother is the only parent who smokes. Among girls, 18.1 per cent smoke if the mother is the only smoker and only 12.4 per cent if the father is the only smoker.

The percentage of smokers among the children in families in which one or both parents has given up cigarette smoking is significantly lower than the percentage in families in which the parent (or parents) has continued to smoke. If one or both parents has discontinued cigarette smoking and neither is a current smoker the proportion of students who smoke is nearly as low (19.5 per cent of boys, 8.8 per cent of girls) as in families in which neither parent ever smoked (16.7 per cent of boys, 6.8 per cent of girls). If one parent has discontinued and the other continues to smoke, the proportion of students who smoke is somewhat higher (23.9 per cent of boys, 12.3 per cent of girls), but remains lower than the proportion in families in which both parents continue to smoke (31.9 per cent of boys, 18.5 per cent of girls).

The percentage of smokers among children in the families in which the father smokes a pipe or cigars, but not cigarettes, is intermediate between those in families in which the father smokes cigarettes and those in which the father has never smoked. In families in which the father smokes, but not cigarettes, and the mother smokes cigarettes, the percentage of smokers among the children (32.0 per cent of the boys and 15.8 per cent of the girls) is about the same as in those families in which both parents smoke cigarettes (31.9 per cent of the boys, 18.5 per cent of the girls). If the father smokes only pipes or cigars and the mother does not smoke, the percentage of smokers (21.1 per cent of the boys and 9.5 per cent of the girls) is closer to those in families in which the parents have never smoked (16.7 per cent of the boys, 6.8 per cent of the girls) or in which neither smokes be-

Table 5—Percentage of Current Regular Cigarette Smokers by Age Within Grade, All Students

	Boys						Girls						Standardized Percentages							
	Freshman			Sophomore			Junior			Senior										
	No.	%		No.	%		No.	%		No.	%		No.	%		Boys	Girls			
Older than classmates	366	30.6	426	40.8	309	45.6	255	41.2	212	13.7	283	21.9	146	25.3	119	25.2	39.4	21.3		
Typical age*	2,044	12.7	2,313	23.7	1,965	30.7	1,536	34.6	2,037	4.1	2,488	10.0	1,918	15.5	1,568	27.1	24.6	13.3		
Younger than classmates	546	10.4	445	17.5	482	23.0	373	34.3	517	2.9	546	7.3	593	16.2	493	23.5	20.3	11.6		
Total	2,956	14.5	3,184	25.2	2,756	31.1	2,164	35.4	2,766	4.6	3,317	10.6	2,657	16.2	2,180	26.2	25.8	13.6		
P (based on column variation)	<0.0001			<0.0001			0.24			<0.0001			0.02			0.39			<0.0001	<0.0001

* Typical age is 14 years for the freshmen, 15 years for the sophomores, 16 years for the juniors, and 17 years for seniors. This group includes a small number of "not stated."

Table 6—Percentage of Current Regular Cigarette Smokers by Athletic Participation, All Students

	Boys						Girls						Standardized Percentages													
	Freshman			Sophomore			Junior			Senior																
	No.	%		No.	%		No.	%		No.	%		No.	%	Boys	Girls										
No Athletics	757	18.2		902	29.8		767	35.6		652	41.0		1,065	4.5		1,428	10.2		1,292	13.5		1,182	23.6	30.3	12.2	
Athletics—no coach	811	16.3		782	28.3		693	37.2		569	37.4		993	5.6		1,185	11.9		948	17.9		768	29.0	29.1	15.2	
Athletics—with coach	1,388	11.5		1,500	20.7		1,296	25.1		943	30.2		708	3.4		704	9.1		417	20.4		230	30.0	21.2	14.6	
Total	2,956	14.5		3,184	25.2		2,756	31.1		2,164	35.4		2,766	4.6		3,317	10.6		2,657	16.2		2,180	26.2	25.8	13.6	
P (based on column variation)	<0.0001			0.003			<0.0001			0.001			0.11			0.17			0.55			0.07			<0.0001	0.07

cause at least one has discontinued (19.5 per cent of the boys and 8.8 per cent of the girls).

School System

The city public high schools supplied 15,927 (72.5 per cent) of the students in the study; the suburban public high schools, 4,016 (18.3 per cent) students; and the Catholic parochial high schools, 2,037 (9.3 per cent) students.

As shown in Table 3, the percentage of smokers is highest among students in the parochial high schools, intermediate among students in the city public high schools, and lowest among those in the suburban public high schools. Among boys the standardized percentage of smokers is 32.0 per cent in the parochial schools, 25.7 per cent in the city schools, and 22.4 per cent in the suburban schools. Among girls the standardized percentage is 20.1 per cent in the parochial schools, 13.8 per cent in the city schools, and 9.6 per cent in the suburban schools. Among the girls in the parochial schools, the percentage of smokers is low in the freshman year, but each successive class contains an appreciably higher proportion of smokers so that at the beginning of the senior year the percentage of smokers is nearly as high as that of the senior parochial school boys and even higher than that of the senior city public school boys.

Parental Educational Level

There were 3,249 (14.8 per cent) students who reported that neither parent was graduated from high school; 3,795 (17.3 per cent) said that one parent was graduated from high school while the other was not; 4,626 (21.0 per cent) had parents both of whom were graduated from high school; 3,651 (16.6 per cent) reported that one parent attended college while the other parent was graduated from high school, and 4,308 (19.6

per cent) reported that both parents attended college. Most of the additional 2,351 (10.7 per cent) students did not state the education of one or both parents while a small proportion reported extreme variations of parental education not provided for within the five classes used.

Table 4 shows that the percentage of smokers is inversely related to the educational level of the parents, varying from 32.1 per cent of the boys and 17.0 per cent of the girls in families in which neither parent was graduated from high school to 20.1 per cent of the boys and 10.7 per cent of the girls in families in which both parents attended college. This relationship, although more pronounced among boys, is found in each of the first three classes, especially the freshman class, but is negligible in the senior class. This suggests that in families of parents with a low educational level smoking is taken up at an earlier time, but that educational level does not affect whether or not smoking is eventually taken up within the high school years.

Age Within Grade

Since age was obtained in terms of "age at last birthday," students could be divided into those at the modal age (14 for freshmen, 15 for sophomores, 16 for juniors, 17 for seniors), those above the modal age, and those below the modal age. The small proportion (2.4 per cent) who did not state age was classified with the modal group. It should be noted that a more precise measure of age to the nearest month would undoubtedly have classified those within a month or two or their next birthday in the next higher age group.

Students who are older than their classmates numbered 2,116 (9.6 per cent), those at the modal age numbered 15,869 (72.2 per cent), and there were 3,995 (18.2 per cent) students who were

Table 7—Percentage of Current Regular Cigarette Smokers by School Activities (Other Than Athletics), All Students

	Boys						Girls						Standardized Percentages													
	Freshman			Sophomore			Junior			Senior			Boys	Girls												
	No.	%		No.	%		No.	%		No.	%															
	No.	%		No.	%		No.	%		No.	%		No.	%												
None	1,336	16.0		1,314	29.3		870	38.9		504	42.3		740	7.7		626	20.1		368	29.1		261	34.5		30.7	22.0
One or more activities	1,620	13.3		1,870	22.2		1,886	27.5		1,660	33.3		2,026	3.5		2,691	8.4		2,289	14.1		1,919	25.1		23.3	11.9
Total	2,956	14.5		3,184	25.2		2,756	31.1		2,164	35.4		2,766	4.6		3,317	10.6		2,657	16.2		2,180	26.2		25.8	13.6
P (based on column variation)	0.14			0.002			<0.0001			0.008			<0.0001			<0.0001			<0.0001			0.005			<0.0001	<0.0001

Table 8—Percentage of Current Regular Cigarette Smokers by Mathematics Course Taken, All Students

	Boys						Girls						Standardized Percentages													
	Freshman			Junior			Sophomore			Senior																
	No.	%		No.	%		No.	%		No.	%		No.	%												
	No.	%		No.	%		No.	%		No.	%		No.	%												
Other	1,044	22.5		1,043	36.4		1,052	39.2		856	42.3		1,044	8.1		1,210	16.6		1,093	21.4		1,005	30.1		34.5	18.3
Algebra	1,912	10.1		2,141	19.7		1,704	26.1		1,308	30.8		1,722	2.5		2,107	7.1		1,564	12.5		1,175	22.8		20.9	10.4
Total	2,956	14.5		3,184	25.2		2,756	31.1		2,164	35.4		2,766	4.6		3,317	10.6		2,657	16.2		2,180	26.2		25.8	13.6
P (based on column variation)	<0.0001			<0.0001			<0.0001			<0.0001			<0.0001			<0.0001			<0.0001			<0.0009			<0.0001	<0.0001

a year or more younger than their classmates.

Table 5 shows that students who are older than their classmates have a very high proportion of smokers (39.4 per cent of the older boys and 21.3 per cent of the older girls, against 24.6 per cent of the boys and 13.3 per cent of the girls of typical age, and against 20.3 per cent of the younger boys, and 11.6 per cent of the girls of younger ages). In fact, the percentage of smokers among pupils older than most of their classmates tends to be higher than among those of the same age who are in the typical school grade for that age. Students who are younger than their classmates tend to have a rate of smoking intermediate between that of their classmates of typical age and that of their age-mates in a lower grade.

Extracurricular Activities

There were 3,078 (27.8 per cent) boys who did not participate in any athletics; 2,855 (25.8 per cent) who reported taking part in athletic activity, but not with a coach; while 5,127 (46.4 per cent) said they participated in sports and had a coach. There were 4,967 (45.5 per cent) girls reporting no athletics; 3,894 (35.7 per cent) saying they participated in some type of sports, but without a coach; and 2,059 (18.9 per cent) who reported engaging in athletics and had a coach.

Table 6 shows that boys who do not participate in athletics, or if they do participate, do not report having a coach, have a higher proportion of smokers (30.3 per cent and 29.1 per cent) than those who report having a coach (21.2 per cent). Participation in athletics is not significantly related to smoking among girls.

There were 4,024 (36.4 per cent) boys and 1,995 (18.3 per cent) girls who reported that they did not take part in any activities other than sports, while 7,036

(63.6 per cent) of the boys and 8,925 (81.7 per cent) of the girls reported that they took part in such extracurricular activities.

Table 7 shows that the percentage of smokers is higher among students who do not participate in school activities other than sports (30.7 per cent of the boys, 22.0 per cent of the girls) than among those who participate in at least one such activity (23.3 per cent of the boys, 11.9 per cent of the girls). Among those who do participate, the lowest percentage of smokers is found among members of honor societies and among those who belong to religious clubs.

College Preparation

A total of 8,347 (38.0 per cent) took general mathematics while 13,633 (62.0 per cent) reported taking algebra but not general mathematics. This question was included to serve as an index of intention to attend college since algebra is ordinarily a required course for college entrance.

Table 8 shows that the percentage of smokers is higher among students who have taken or are taking general mathematics rather than algebra (34.5 per cent versus 20.9 per cent among the boys; 18.3 per cent versus 10.4 per cent among the girls).

Patterns of Smoking

Table 9 shows that among current regular smokers more than half the boys and almost three-quarters of the girls smoke filter cigarettes exclusively. The proportion of exclusive filter users, however, varies inversely with the amount smoked, ranging from 72.9 per cent of the boys and 85.1 per cent of the girls who smoke one to six times a week to 38.7 per cent of the boys and 47.0 per cent of the girls who smoke a pack or more a day.

The smoking environment defined as

Table 9—Percentage Distribution of Regular Cigarette Smokers, by Amount Smoked According to Type of Cigarette Smoked, Smoking Environment, and Median Length of Time Smoked, All Students

	Boys					Girls						
	1-6 per Week	1-4 per Day	5-9 per Day	10-19 per Day	20+ per Day	Total	1-6 per Week	1-4 per Day	5-9 per Day	10-19 per Day	20+ per Day	Total
Type of Cigarette Usually Smoked												
Filter only	72.9	62.7	54.2	46.6	38.7	57.4	85.1	75.2	67.7	65.4	47.0	73.6
Plain only	18.3	28.9	38.9	48.9	49.8	35.0	9.3	19.8	26.7	32.1	33.3	20.7
Mixed	6.3	6.7	6.1	4.2	9.5	6.2	3.5	4.2	5.1	2.5	18.2	4.7
Not stated	2.4	1.6	0.7	0.4	2.0	1.3	2.0	0.8	0.5	—	1.5	1.0
No. of smokers	584	730	732	552	253	2,851	397	480	375	162	66	1,480
Per cent	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Smoking Environment												
Usually only with others	34.8	21.9	8.5	4.9	4.7	16.3	36.8	23.5	7.7	3.7	7.6	20.2
Usually only alone	9.1	5.9	3.7	0.5	2.0	4.6	15.4	11.9	3.5	1.9	1.5	9.1
Mixed	53.1	71.1	85.4	93.1	89.3	77.0	45.8	63.3	86.7	93.8	89.4	69.1
Not stated	3.1	1.1	2.5	1.4	4.0	2.2	2.0	1.3	2.1	0.6	1.5	1.6
No. of smokers	584	730	732	552	253	2,851	397	480	375	162	66	1,480
Per cent	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Median No. of months smoked	18	24	30	36	48	28	12	20	24	28	36	22

usually smoking when alone or usually smoking in the company of others, or both, also varies with the amount smoked. About nine out of ten of those who smoke five or more cigarettes a day do so in both situations. Among those who smoke less than this amount, however, about three out of ten usually smoke when in the company of others and one out of ten usually smokes when alone. Solitary smoking is about twice as common among girls than boys for this group of regular smokers consuming less than five cigarettes a day.

The length of time that current regular smokers report they have been smoking also varies widely by the amount smoked for both boys and girls. The median number of months smoked for those smoking one to six times a week is 18 months for boys and 12 months for girls, while for those smoking a pack or more a day it is 48 months for boys and 36 months for girls. Characteristics of regular smoking, such as type of cigarette, social versus solitary or mixed smoking, and length of time since starting to smoke are more closely related to the rate of current smoking than to school class.

Discussion

A number of groups with a high proportion of regular smokers within the high school population have been identified. These include two measures relating to the family (parental smoking and parental education), four personal characteristics relating to peer groups within the school (organized athletics for boys, other extracurricular activities, type of mathematics course taken, and age in relationship to classmates), and finally the school system.

What is the relative importance of these several measures and to what extent do they overlap? An analysis of variance of the four personal-school factors shows that for the boys, participa-

tion in athletics and participation in other extracurricular activities are more or less equivalent in terms of proportions of students smoking. When these two factors are combined into one, the three factors that remain are roughly equal in effect and additive. An index from 0 to 3 was therefore constructed giving 1 point for nonparticipation in extracurricular activities (including organized athletics for the boys), 1 point for taking general mathematics (rather than algebra alone) and 1 point for being above the modal age of one's classmates. About half of the students are in class 0, 35 per cent in class 1, 13 per cent in class 2, and the small remainder (3 per cent of the boys and 2 per cent of the girls) in the extreme class 3. Table 10 shows the proportion of current regular smokers in each group. There is a significant increase in the percentage of smokers for each additional point in the index score with the standardized proportion of smokers ranging from 18.4 per cent for boys with a score of 0, to 28.9 per cent, 37.4 per cent, and 53.0 per cent for each successive score. For girls, the corresponding proportion of smokers varies from 9.5 per cent for score 0, to 14.9 per cent, 24.5 per cent, and 28.3 per cent for each successive score.

When a cross-tabulation is made of parental education by the personal-school index, it is clear that most of the relationship with smoking is accounted for by the index since, within constant levels of the index score, there is no significant variation by parental educational level.

When a cross-tabulation is made of the proportion of smokers, by parental smoking and the personal-school index, it is clear that these two factors are independently important since the proportion of regular smokers varies directly with each factor even when the other is held constant. The most extreme groups, in terms of cigarette smokers, are therefore those with an index score of 0 whose parents do not smoke (11.3 per cent of

Table 10—Percentage of Current Regular Cigarette Smokers by Index of Personal-School Factors, All Students

Index	Boys									Girls									Standardized Percentages							
	Freshman			Sophomore			Junior			Senior			Freshman			Sophomore			Junior			Senior			Boys	Girls
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%						
0	1,374	8.0	1,539	17.1	1,336	23.1	1,072	28.7	1,302	1.8	1,723	5.8	1,412	11.9	1,084	22.2							18.4	9.5		
1	1,030	16.7	1,087	28.3	971	33.7	738	40.5	992	4.9	1,131	11.7	992	17.5	837	29.3							28.9	14.9		
2	467	25.1	461	36.9	374	47.1	305	42.6	412	10.4	401	25.7	285	30.2	229	33.6							37.4	24.5		
3	85	35.3	97	61.9	75	58.7	49	57.1	60	20.0	62	27.4	38	39.5	30	26.7							53.0	28.3		
Total	2,956	14.5	3,184	25.2	2,756	31.1	2,164	35.4	2,766	4.6	3,317	10.6	2,657	16.2	2,180	26.2							25.8	13.6		
P (based on column variation)	<0.0001			<0.0001			<0.0001			<0.0001			<0.0001			0.003			<0.0001			<0.0001				

the boys and 5.1 per cent of the girls smoke) and those with an index score of 3, both of whose parents smoke (58.9 per cent of the boys and 32.3 per cent of the girls smoke).

If all students had the proportion of smokers found among those with parents who do not smoke, there would be 32 per cent fewer smokers among the boys and 46 per cent fewer among the girls. If all students had the proportion of smokers found among those with a personal-school index of 0, there would be 28 per cent fewer smokers among the boys and 29 per cent fewer among the girls. If all students had the proportion of smokers found among those who have both an index score of 0 and parents who do not smoke, there would be 54 per cent fewer smokers among the boys and 60 per cent fewer among the girls.

In other words these two independent factors are almost completely additive. Jointly they account for over one-half the boys who smoke and for three-fifths of the girls who smoke.

The relatively high proportion of smokers in the Catholic parochial schools and the relatively low proportion of smokers in the suburban schools is not accounted for by differences in the factors described above. In fact, the parochial schools contain a slightly higher proportion than do the other schools of the students with a low index score and from more highly educated families, the type of students that would tend to have a smaller proportion of smokers. Questions were included in the second questionnaire on the attitudes of the students toward smoking and on their parents' reactions toward smoking by the respondents. These two areas of investigation, now being analyzed, may throw some light on this finding.

Summary

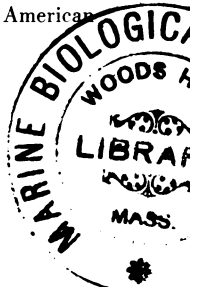
A study was made of smoking among high school students in Portland, Ore.,

and the surrounding highly urbanized area. Two relatively independent factors were found that describe the groups with a high proportion of smoking: (1) a correspondence with family practices as indicated by parental smoking, and (2) a syndrome of personal factors characterizing inactive students (nonparticipants in extracurricular activities) who tend to be scholastically unsuccessful (older than their classmates) and with lower academic goals (not taking algebra as a college preparatory course).

The significantly higher proportion of smokers found in the Catholic parochial schools is not accounted for by these factors.

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The authors are associated with the Medical Affairs Department, American Cancer Society, Inc., New York, N. Y.



Problems of "Man Versus Environment"

A conference on "Man Versus Environment" was held in May, 1958, to review and evaluate problems of public health resulting from new developments in science and technology. At that time attention was focused on the research needs in the major fields of water supply, water pollution, air pollution, food technology, and occupational health.

The conference was sponsored by the National Institutes of Health and the Bureau of State Services of the Public Health Service. Henry F. Vaughan, Dr.P.H., retiring dean of the Michigan School of Public Health, who was chairman of the National Institutes' Sanitary Engineering and Occupational Health Study Section, conceived the conference and headed the group planning for it. Robert A. Kehoe, M.D., director, Ketter-

ing Laboratory of Applied Physiology, University of Cincinnati College of Medicine, made the keynote address.

Dr. Kehoe's address, together with the conference summary by Abel Wolman, professor of sanitary engineering, Johns Hopkins University, is included in the proceedings now available. Also to be found are the addresses of Leslie A. Chambers, Ralph Fuhrman, Mark E. Hollis, Harry E. Jordan, Louis C. McCabe, Jack E. McKee, Emil Mrak, James H. Sterner, and Walter Tiedeman.

The proceedings, which were edited by Harry A. Faber and Marie H. Peak of the Division of Engineering Services staff, are available from Research Grants Coordinator, Division of Engineering Services, Public Health Service, Washington 25, D. C.